NAVY ATE and TPS ACQUISITION HANDBOOK

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Acronyms

ACAT	Acquisition Category
AMB	ATS Management Board
ASN(RDA)	Assistant Secretary of the Navy (Research, Development and Acquisition)
ATE	Automatic Test Equipment
ATS	Automatic Test Systems
CASS	Consolidated Automated Support System
CBA	Cost & Benefit Analysis
CIP	CASS Implementation Plan
CTAVR	Commercial Tester Acquisition Validation Request
EA	Executive Agent
EAO	Executive Agent Office
IFTE	Integrated Family of Test Equipment
ILS	Integrated Logistics Support
IMA	Intermediate Maintenance Activity
IPT	Integrated Product Team
JTA	Joint Technical Architecture
MARCORSYSCOM	Marine Corps Systems Command
MDA	Milestone Decision Authority
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
OEM	Original Equipment Manufacturer
OIPT	Overarching Integrated Product Team
OSD	Office of Secretary of Defense
OUSD	Office of the Under Secretary of Defense
PEO	Program Executive Officer
PM	Program Manager
SAPG	Site Activation Planning Guide
SPAWAR	Space and Naval Warfare Systems Command
SRA	Shop Replaceable Assembly
SSM+	System Synthesis Model Plus
SSP	Director, Strategic Systems Program
STCM	Standard TPS Cost Management System
TAMS	Test and Monitoring Systems
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TPS	Test Program Set
UUT	Unit Under Test
WIPT	Weapons System Integrated Product Team
WRA	Weapons Replaceable Assembly

1. Introduction

This handbook has been developed to provide familiarization and guidance to Navy/Marine Corps System Commands and their supporting field components in determining requirements, planning acquisitions and managing Automatic Test Equipment (ATE) and Test Program Sets (TPS). The goal of the information provided is to:

1. Describe ATE/TPS-related policy, procedures, and processes used in both DoD and the Navy
2. Present technical information relative to the Consolidated Automated Support System (CASS), the Navy's standard ATS Family for support of all Navy electronics from aircraft to ships and submarines at Intermediate Maintenance Activities (IMAs) both ashore and afloat as well as at Navy repair depots.
3. Present technical information relative to the Guided Weapons Test Station, the navy's standard ATS family for testing munitions All-Up-Rounds and Guidance Sections.
4. Identify points of contact and sources of additional information, including lessons learned

The information in this Handbook will be updated and expanded regularly to reflect the most recent DoD and Navy policy, guidance and lessons learned for ATE and TPS. To obtain a copy of this document contact NAVAIR PMA-260D, Mr. William A. Ross at (301) 757-6907. It may be downloaded at http://pma260.navy.mil/handbook.doc.

2. Policy for Acquisition of ATS

DoD Policy

On 29 April 1994, USD (A&T) Memo "DoD Policy for Automatic Test Systems (ATS)" established policy that DoD components shall satisfy all acquisition needs for automatic test equipment hardware and software by using designated ATS families. It stated that ATS capabilities shall be defined through control of critical hardware and software elements and interfaces to ensure DoD family tester and COTS tester and component interoperability, and to meet future DoD test needs. This memo designated the Army's Integrated Family of Test Equipment (IFTE) and the Navy's Consolidated Automated Support System (CASS) as initial DoD families. Since then, the Marine Corps' Third Echelon Test Set (TETS), and the Joint Service Electronic Combat Test Systems Tester (JSECST) have been added to the list of approved DoD Family Testers.

DoD 5000.2-R was first published on 15 March 1996 and stated DoD ATS policy: "DoD automatic test system (ATS) families or COTS components that meet defined ATS capabilities shall be used to meet all acquisition needs for automatic test equipment hardware and software. ATS capabilities shall be defined through critical hardware and software elements. The introduction of unique types of ATS into the DoD field, depot, and manufacturing operations shall be minimized."

Change 1 to DoD 5000.2-R was issued on 6 October 1997 and added the requirement that "the selection shall be based on a cost and benefit analysis that ensures that the ATS chosen is the most beneficial to the DoD over the system life cycle." Subsequent changes to DoD 5000.2-R have retained this requirement.

Basically, the OSD policy says to minimize the introduction of unique types of automatic test equipment by using DoD Designated ATS Families **or** use commercial components that meet certain technical criteria (as discussed in the COTS section of Chapter 5 of this Handbook). ATS selections are to be cost beneficial to DoD (not necessarily what is best for the individual project or Service) over the life cycle. When new systems are developed, an open system approach shall be followed.

SECNAV Policy

SECNAVINST 3960.6, "DON Policy and Responsibility for Test, Measurement, Monitoring, Diagnostic Equipment and Systems, and Metrology and Calibration (METCAL)" of 12 October 1990 has three main purposes:

a. To establish Navy policy and responsibility for incorporating testability and diagnostic capability into weapons platforms, weapon systems, surveillance, communications, navigational guidance, deception/protection systems, meteorological systems, and associated support systems.

b. To establish policy and responsibility for the selection, development, acquisition, standardization, application, and logistics support of test, measurement, monitoring, diagnostic equipment and systems.

c. To implement the Department of Navy Metrology and Calibration (METCAL) Program, and to assign responsibilities within the Department of the Navy for METCAL.

Specific policies and procedures in SECNAVINST 3960.6 relative to ATE and TPSs include the following:

- General purpose test equipment shall be used where possible.
- Commercially available test equipment and systems shall be used if they meet environmental requirements imposed by the operational mission and can be logistically supported.
- ATE should be standardized as much as possible.
- CASS is being developed as the Navy's standard ATE. Systems acquisition managers (program managers) will study and determine if and when it is economically practical to transition to CASS. Until then, they will continue to use their present test equipment.
- In the future, use of non-CASS ATE will require Assistant Secretary of the Navy for Research, Development, and Acquisition ASN(RD&A) approval.
- New ATE shall not be acquired if CASS can satisfy the requirements.
- Acquisition and life cycle costs must be considered during the design and acquisition process and in performing diagnostic capability trade-offs.
- TPS development and distribution costs shall be included in the life cycle cost of ATE for acquisition planning.

OPNAV Policy

OPNAVINST 3960.16, "Navy Test and Monitoring Systems", of 18 January 1995 implements SECNAVINST 3960.6 and assigns responsibility for Navy Test and Monitoring Systems (TAMS). It assigns NAVSEA with Lead SYSCOM responsibility for TAMS and designates NAVAIR as Lead SYSCOM for ATE.

Specific policies and procedures in OPNAVINST 3960.16 relative to ATE and TPSs include the following:

- Utilize built-in-test, built-in-test equipment, general purpose test equipment, special purpose test equipment and/or ATE for condition monitoring, fault verification and fault isolation at each level of maintenance. The mix of equipment utilized will be established by the results of the testability and level of repair portions of the logistics support analysis process performed up-front on the system to insure the availability of adequate test, measurement and calibration capability at the lowest cost effective maintenance level.
- Minimize the use of special purpose (peculiar) test equipment and maximize the use of commercial/non-developmental standardized (common) test equipment.
- New ATS shall not be acquired if the requirement can be satisfied by the CASS. Exceptions to the use of CASS shall require a waiver approved by ASN(RDA).
- Ensure that system and subsystems contractors use the same diagnostic capability (i.e., no special factory test equipment) that will be used under operational conditions to perform factory diagnostics for units under production. This applies specifically to ATS for field, depot and factory testing.

- Waivers for non-standard ATE (non-CASS) will be submitted to ASN(RDA) via CNO (N43), and waivers for remaining TAMS policy requirements will be submitted to NAVSEA, NAVAIR, SSP, and SPAWAR as appropriate.

SYSCOM Policy

NAVAIRSYSCOM

NAVAIRINST 13630.2C of 27 November 1996 establishes policy, assigns responsibilities, and provides procedures for optimizing the use of CASS and associated TPSs by the Naval Aviation Systems Team. Is assigns PMA-260, the CASS Program Manager, with responsibility for

(1) budgeting, acquisition and support of CASS,

(2) budgeting and acquisition of TPSs being used on existing legacy ATE for offload to CASS, and

(3) assessment of weapon system IPT TPS acquisitions prior to proposal initiation and again prior to fielding.

This instruction details the process for matching weapon system support requirements to specific configurations of CASS and it contains the format and specific procedures for requesting a waiver to using CASS.

NAVAIRINST 5400.118A of 28 May 1997 assigns PMA-260 with responsibility to develop and maintain a generic TPS procurement package and process for use by other Program Managers, Assistant Program Managers Logistics (APMLs) and NAVSEA.

In synopsis, PMA-260 budgets for and manages CASS itself and TPSs being offloaded from legacy ATE. TPSs for new weapons systems, weapon systems subsystems and components, and changes to weapon systems are funded and managed by the respective Program Manager.

NAVSEASYSCOM

NAVSEAINST 9082.1A, Life Cycle Management of Test, Measurement and Diagnostic Equipment, established policy and assigns responsibilities for the management, operation and logistics support of NAVSEA-cognizant TMDE. It also requires the use of CASS and details NAVSEA procedures for obtaining a waiver to the requirement to use CASS.

SPAWARSYSCOM

SPAWAR 4700.16M, Maintenance Policy and Procedures, requires the use of CASS as the Navy's standard ATE. It states that the CASS system standardizes hardware and software testability requirements for all future TPS development in support of SPAWAR systems and equipment. This requirement applies to all new systems with an IOC of FY92 and beyond. Existing systems will be transitioned to a CASS-compliant configuration when they undergo major modifications/upgrade, or as is economically feasible, based on fleet priorities. It also states the requirement for ASN(RDA) approval for use of non-CASS ATE.

Navy Test and Monitoring Systems

SECNAVINST 3960.6 and OPNAVINST 3960.16 assigned NAVSEA with Lead SYSCOM responsibility for Test and Monitoring Systems (TAMS). The TAMS Executive Board was established on 14 February 1992 to provide a corporate overview for Navy TAMS and to ensure that an efficient process is in place for managing these systems. A Flag Officer or Senior Executive chairs the TAMS EB. Membership consists of NAVSEA (SEA04), NAVAIR (PMA-260, Air-3.0B), SPAWAR, Director Strategic Systems Program (DIRSSP 2016), MARCORSYSCOM (PM-TMDE), OPNAV (N43), CINCLANTFLT (N435), and CINCPACFLT (N431).

The TAMS Executive Board establishes working groups to address specific areas as required. Current TAMS working groups are (1) ATE, (2) calibration standards, and (3) consolidation of calibration laboratories. NAVAIR PMA-260 leads the TAMS ATE Working Group.

3. Definitions

Automatic Test System

An Automatic Test System (ATS) includes Automatic Test Equipment hardware and its operating software, Test Program Sets, which include the hardware, software and documentation required to interface with and test individual weapon system component items, and associated TPS software development tools, referred to as the test environment. The term ATS also includes on-system automatic diagnostics and testing.

Automatic Test Systems are used to identify failed components, adjust components to meet specifications, and assure that an item is ready for issue.

Automatic Test Equipment

ATE refers to the **test hardware** and its own operating system **software**. The hardware itself may be as small as a man-portable suitcase or it may consist of six or more racks of equipment weighing over 2,000 pounds. ATE is often ruggedized commercial equipment for use aboard ships or in mobile front-line vans. ATE used at fixed, non-hostile environments such as depots or factories may consist purely of commercial off-the-shelf equipment.

The heart of the ATE is the **computer** which is used to control complex **test instruments** such as digital voltmeters, waveform analyzers, signal generators, and switching assemblies. This equipment operates under control of **test software** to provide a stimulus to a particular circuit or component in the unit under test (UUT), and then measure the response at various pins, ports or connections to determine if the UUT has performed to its specifications.

The ATE has its own **operating system** which performs housekeeping duties such as self-test, self-calibration, tracking preventative maintenance requirements, test procedure sequencing, and storage and retrieval of digital technical manuals.

ATE is typically very flexible in its ability to test different kinds of electronics. It can be configured to test both black boxes (called Weapons Replaceable Assemblies (WRAs)) and circuit cards (called Shop Replaceable Assemblies (SRAs)).

ATE is also used to test All-Up-Round weapons and weapon sections.

Test Program Set

A Test Program Set typically consists of

- test program software
- hardware, including interface devices, holding fixtures and cables
- documentation

The computer in the ATE executes the test software, which usually is written in a standard language such as ATLAS, C or Ada. The stimulus and measurement instruments in the ATE have the ability to respond as directed by the computer. They send signals where needed and take measurements at the appropriate points. The test software then analyzes the results of the measurements and determines the probable cause of failure. It displays to the technician the component to remove and replace.

Developing the test software requires a series of tools collectively referred to as the TPS software development environment. These include ATE and UUT simulators, ATE and UUT description languages, and programming tools such as compilers.

Since each UUT likely has different connections and input/output ports, interfacing the UUT to the ATE normally requires an **interface device** (ID) which physically connects the UUT to the ATE and routes signals from the various points in the ATE to the appropriate I/O pins in the UUT.

An objective of the ATE designer is to maximize the capability inherent in the ATE itself so that IDs remain passive and serve to only route signals to/from the UUT. However, since it is impossible to design ATE which can cover 100% of the range of test requirements, IDs sometimes contain active components which condition signals as they travel to and from the ATE. The more capable the ATE, the less complex the IDs must be. An ATE with only scant general capability leads to large, complex and expensive IDs. Some IDs contain complex equipment such as pneumatic and motion sources, optical collimators, and heating and cooling equipment.

Wherever possible, test programs are bundled into groups of UUTs which use one ID. These are called Operational Test Program Sets (OTPS) and may contain as many as 15 SRAs or two to three functionally similar WRAs.

Open Systems and How They Apply to ATS

An open system is a system that is based on widely-used and commonly-accepted interfaces as opposed to narrow Military Specifications or proprietary designs. The typical personal computer is an excellent example of an open system. While the motherboard may be proprietary to the designer, the integrator of the system can choose from a wide range of sources for other required devices such as the hard drive, memory, serial and parallel ports, modem, keyboards, and monitors. This is because the PC industry standardizes at the interface level instead of at the hardware level, leaving the integrator free to choose system components that satisfy his/her cost, reliability and performance requirements.

Similarly, an ATS open system uses the same strategy (defining requirements at the interface) which results in a wide range of benefits including:

- optimizing use of available commercial hardware and software to hold down costs,
- encouraging competition,
- providing flexibility in terms of hardware expandability and software interchangeability with no penalty to system requirements, and
- facilitating the future rehost and interoperability of TPSs.

An open systems approach to ATS design then is a business and engineering strategy to choose commercially supported specifications and standards for selected system interfaces (logical and physical), products, practices, and tools. Selection of commercial specifications and standards is based on:

- those adopted by industry consensus-based standards bodies or de facto standards (those successful in the market place);
- market research that evaluates the short and long term availability of products built to industry accepted specifications and standards;
- a disciplined systems engineering process that examines tradeoffs of performance, supportability and upgrade potential within defined cost constraint; and
- allowance for continued access to technological innovation supported by many customers and broad industrial base.

An open systems approach provides a foundation for lower life cycle costs and improved systems performance through the use of standards-based architectures and greater access to commercial electronics technology, products and processes. A framework for open systems implementation is achieved by addressing the key considerations of interfaces, architecture, risks and supportability.

The DoD ATS EAO has chartered a DoD ATS Research & Development IPT (ARI) which has developed a standard ATS architecture based on an open systems approach. From this architecture, a PM can derive a specific implementation for his/her automatic testing needs while gaining the advantages of using an open systems approach. The ARI has defined key ATS interfaces in terms of hardware, software and information frameworks, and as specifications for each of these key interfaces are approved, they are published by the DoD ATS EAO and can be found at the DoD ATS EAO Web Site (http://dodats.osd.mil). To help PMs in implementing the architecture, the ATS EAO has published an ATS Architecture Guide, which is also available at the DoD ATS EAO Web Site.

4. Overview

Developing an ATS Acquisition Strategy

The PM's goal in selecting a support solution should be to minimize life cycle cost to the DoD. The implications of this statement are:

- All costs over the life of the weapon system acquisition must be considered, and
- The PM must think beyond his/her program and consider not what might be the cheapest or most expedient solution for his/her own program or even the Navy, but what is the best solution from the DoD perspective.

Program Manager's Authority

DoD ATS policy and Navy policy do not diminish the PM's responsibilities or change established acquisition processes or authority. Rather, they provide a framework in which to satisfy weapon system support needs. If the PM has a compelling reason for acquiring an ATS that does not comply with DoD or Navy policy, the Milestone Decision Authority (MDA) has the authority to approve the acquisition.

For more information….

Contact Your SYSCOM's ATS Office:

The first step in any potential ATS acquisition is to contact your Service's ATS Office.

SYSCOM	Name	Code	Telephone	E-mail
NAVAIR	Bill Ross	PMA-260D	(301) 757-6907	rosswa@navair.navy.mil
NAVSEA	Tom Ingram	SEA-04M	(703) 602-0969 x 620	ingramtw@navsea.navy.mil
SPAWAR	Mike Nguyen	04L	(619) 524-3080	nguyenm@spawar.navy.mil
SSP	Eli Zacharia	220163	(703) 602-0133	eli_zacharia@ssp.navy.mil
MARCORSYSCOM	Mike Heilman	TMDE-A	(703) 784-4489	heilmanml@mcsc.usmc.mil

Contact the DoD ATS Executive Agent Office

Although the Program Manager's primary source of information relative to automatic testing is his/her SYSCOM ATS POC, the DoD ATS EAO staff is always available to answer questions and to help in any way possible. Call the Assistant Director of the ATS EAO, Bill Ross, at (301) 757-6907 (e-mail rosswa@navair.navy.mil).

Check Relevant Web Sites on the Internet

The DoD ATS EAO has established a Web Site at http://dodats.osd.mil/ that contains information relative to automatic testing. Also available at this Web Site are guides such as the DoD ATS Master Plan, the DoD ATS Selection Process Guide, and the DoD ATS Acquisition Handbook, as well as many other ATS-related documents. The EAO Web Site has several links to other ATS-related sites.

5. ATS Acquisition Processes and Procedures

The ATS selection process used in the Navy implements the DoD ATS acquisition process which is published in the DoD ATS Selection Process Guide, available from the DoD ATS Executive Agent Office (rosswa@navair.navy.mil) and at the DoD ATS EA Web Site (http://dodats.osd.mil).

Requirements Definition

The selection process begins with an understanding of the test requirement, i.e., parametric (performance), maintenance, logistics, and operational test requirements for the targeted UUTs.

As part of the Logistics Support Analysis process associated with a weapon system acquisition, the ILS manager will perform a series of analyses for each component in the weapon system. Among these analyses are a maintenance task analysis and a Level of Repair Analysis (LORA). As part of the maintenance task analysis, the ILS manager determines the range and depth of ILS resources including ATSs. The LORA, which is an economic model, determines where the ATSs are to be positioned, i.e., at what level of maintenance the ATS should be employed, and, therefore, the quantity of ATSs required.

In a general sense, complex electronic components are expensive and inherently unreliable. Treating them as consumable items is usually not affordable. The two-level maintenance concept of O to OEM has not proven to be the panacea originally envisioned. Establishing organic repair capability at some level of maintenance is usually necessary. When deployed, readiness requirements sometimes override affordability in support decisions.

The customary repair scenario is to
(1) test the failed item,
(2) fault isolate down to a part that can be replaced,
(3) remove/replace the failed part,
(4) re-test the item, and
(5) return the item to service.

Parametric information about the UUTs is normally obtained through using a specific CDRL deliverable on the weapon system contract.

ATS Support Alternatives

Once the test requirements are thoroughly defined, potential ATS alternatives can be considered. The intent of the policy is the selection of ATS in a DoD context: i.e., DoD’s investment in ATS must be leveraged within the Service and/or across each Service. The following hierarchy of alternatives is provided for the selection of Navy ATS consistent with the DoD ATS acquisition policy:

- DoD Designated ATS Family - CASS is the Navy's DoD ATS Family
- Commercial, Off-the-Shelf Tester[1]
- Current Navy weapon System ATS[2]
- Other DoD Inventory ATS[2]

- New Development ATS[2]

[1] Commercial Tester Acquisition Validation Required
[2] Policy Deviation Required

A program office with an ATS acquisition requirement should consult with their SYSCOM's ATS Office to determine whether the proposed ATS solution deviates from the policy. An acquisition which deviates from DoD or Navy policy will be reviewed by the DoD ATS EAO (PMA-260), which will make a recommendation to the appropriate decision authority.

CASS

CASS, a DoD designated ATS Family, was developed by NAVAIR as the Navy standard ATE for support of electronic systems at Intermediate Maintenance Activities (IMAs) both ashore and afloat in addition to Navy repair depots. CASS was designed to be modular and currently consists of five configurations:

1) Hybrid (HYB),
2) Radio Frequency (RF),
3) Communications, Navigation, and Identification (CNI),
4) Electro-Optical (EO), and
5) Reconfigurable Transportable CASS (RT CASS).

Additional capabilities such as pneumatic functions are provided through various ancillary equipment items. See Appendix 1 for a detailed listing of CASS technical capabilities.

The various mainframe configurations of CASS contain five or six racks of test instruments fully integrated into a complete test system. To avoid obsolescence and allow upgrades for testing future weapon technologies, CASS uses a flexible hardware and software architecture. Today, CASS is demonstrating strong performance towards meeting its primary objectives:

- increased weapon system material readiness,
- reduced weapon system initial, support and life cycle costs,
- reduced proliferation of peculiar support equipment,
- improved tester availability, and
- Navy-wide testing capability for existing and future electronic requirements.

Reconfigurable-Transportable CASS (RT-CASS) is currently being developed to initially support the V-22 requirement for deployable ATE and has both CASS hybrid and RF capability required to support V-22 WRAs/SRAs. Its use will be expanded to eventually replace mainframe CASS at all USMC CASS sites. RT-CASS is packaged in nine man portable hardened cases.

CASS Modernization. CASS was initially designed in 1986 and began production in 1990. By the mid-2000s, the first production CASS stations will have reached a point where aging and obsolete components (CASS is 85% COTS) will drive untenable ownership costs. To address this problem, the Navy has begun planning for modernization of CASS. Maturing simulation-based test technology will permit a significant reduction in hardware (as much as 65%) while providing the test capability required during the next 30 years. Hardware will focus on test functions vice stand-alone test instruments, and synthetic instrument software will facilitate the reduction in required hardware. Also, true Pin Electronics, which provides multiple signals at a pin thereby allowing parallel (functional) test, has matured. These next generation technologies (along with a few others) are referred to as the NxTest set of technologies. NxTest is a Joint Services initiative for demonstration of these technologies. The NxTest schedule involves conducting technology demonstrations through 2002 followed by building a system prototype. The NxTest technology will be ready for incorporation into CASS as a formal change, or as a production incorporation into RTCASS production starting in 2006. Comprehensive development and operational testing are planned, and Test Program Set regression testing will ensure that TPS rehost costs are trivial.

In addition to CASS, other DoD ATS Families are the Army's IFTE, the Joint Services Electronic Countermeasures System Tester (JSECST), and the USMC Third Echelon Test Set (TETS).

COTS

The acquisition of commercial, off-the-shelf testers is in compliance with the DoD and Navy ATS acquisition policy, however; each proposed COTS tester must go through a validation process. The validation process consists of completion of a validation request form that ensures:

- the tester meets the definition for a commercial item in the DFAR
- the commercial tester acquisition is the most economical solution-based on a simplified Life Cycle Cost (LCC) analysis, and
- the tester includes all mandated key elements developed by the DoD ATS R&D IPT (ARI) and published by the ATS EAO. Check the DoD ATS EAO Web Site (http://dodats.osd.mil/) for the DoD ATS Architecture Guide (presents the entire architecture for ATS) plus the latest status of key elements. The following table presents key elements approved to date:

Interface	Acronym	Specification
1	Digital Test Format (SDF)	LSRTAP (SDF) Specification
2	Frameworks (FRM)	VPP-2 System Frameworks Specification
3	Instrument Driver (DRV)	VPP-3.x Family of Instrument Driver Specifications
4	Instrument Communication Manager (ICM)	VPP-4.x Family of Instrument Software Architecture Specifications
5	Computer to External Environments (CXE)	Hardware must support TCP/IP
6	Network Protocols (NET)	DARPA Internet Program Protocol (Std 5) and Transmission Control Protocol (Std 7) Specifications

In addition**,** a description of any non-recurring effort associated with integrating components must be provided.

The required information is certified through submission of the Commercial Tester Acquisition Validation Request (CTAVR) found in Appendix 2 through the SYSCOM's ATS POC to the DoD ATS Executive Agent Office (PMA-260). A copy of this form can also be downloaded from the ATS EA WWW Site (http://dodats.osd.mil/) in Microsoft Word 95 format.

Other

Alternatives to CASS (and other DoD ATS Families) and COTS include current Navy weapon system ATS (non-CASS), other DoD-inventory ATS, and new development ATS.

A formal policy deviation approval (Appendix 3) is required prior to the acquisition or modification of any ATS in the following cases:

- development or procurement of new ATE that is not part of the CASS or another DoD ATS Family, unless it is validated as a commercial tester
- re-procurement of existing ATS that is not part of the CASS or DoD ATS Family
- modifications to existing ATE that is not part of CASS or a DoD ATS Family when the modification adds capability to the ATE for testing additional UUTs
- development or procurement of new TPSs for use on ATE that is not part of CASS or another DoD ATS Family unless the target ATE is a validated commercial tester, and
- modification or rehost of an existing TPS for use with ATE that is not part of CASS or another DoD ATS Family when the change/rehost adds capability to the ATS for testing additional UUTs, unless the target ATE is a validated commercial tester.

Analysis of Alternatives

Prior to selecting an ATS alternative, an analysis must be made to assess the ability of each alternative to support the maintenance and operational requirements of the weapon system in a cost-effective manner over the life-cycle of the system. The analysis must include the DoD ATS Families. While the specifics of how these analyses are performed are not mandated, the ATS EAO has made two tools available to facilitate the process: (1) the System Synthesis Model (SSM+) to assist in the parametric analysis, and (2) an automated Cost & Benefit Analysis (CBA). The use of these tools is encouraged to facilitate consistent and comprehensive analyses. When required, the results of these analyses can be used to support a policy deviation request or a commercial tester acquisition validation request.

SSM+, maintained and managed by NAWCAD Lakehurst, is an integral part of the Navy's ATS planning process. It provides a parametric mapping model to determine optimum ATE station configurations and a workload model to determine optimum station quantities. It is also a valuable tool that can be used in performing parametric analyses as part of the DoD ATS selection process. SSM+ provides Program Managers with an automated tool for mapping a weapon system's Unit-Under-Test (UUT) test requirements to ATS within the DoD ATS Family or any other target ATS platform. SSM+ maps UUT test requirements to target ATS test capabilities and identifies limitations of candidate ATS platforms to support the UUT test requirements. Currently there are over a dozen ATS Families modeled in SSM+, including CASS, IFTE, the F-15 Downsized Tester, RF METS, TETS, and the Teradyne L393 Family of ATE. For ATS not currently modeled in SSM+, users can provide ATS specifications to NAWCAD Lakehurst for inclusion in the SSM+ ATS Test Capability database.

SSM+ Parametric Analysis Process: SSM+ parametric analysis is a three-step process consisting of: (1) UUT Parametric Test Requirement Data Collection, (2) UUT Parametric Test Requirement Data Entry, and (3) SSM+ Parametric/Exception Analysis.

> *Step 1. UUT Parametric Test Requirement Data Collection:* SSM+ data sheets outline SSM+ UUT test requirement data which must be collected to run SSM+ against a set of UUTs. There are currently a total of 28 test categories, each of which contain several parametric fields as required to specify the test requirement. For each UUT, SSM+ data should be collected for all applicable test categories. SSM+ data sheets are available through the Service AMB representative and NAWCAD Lakehurst. These sheets may also be downloaded in Microsoft Word format for the DoD ATS EA Web Site (http://dodats.osd.mil/selprogd.htm).
>
> *Step 2. UUT Parametric Test Requirement Data Entry:* Once SSM+ parametric test requirement data has been collected against a weapon system or set of UUTs, this data must be entered into the SSM+ UUT Test Requirement Database. SSM+ operates on a Digital Equipment Corporation VAX/VMS family of computers and is hosted at NAWCAD Lakehurst. Approved users can access this computer via local network, modem, or Internet, using VT200, or higher, series of terminals or a PC emulating these terminals. It is planned that access to SSM+ will be available over the World Wide Web through a standard Web Browser in early FY-00. For questions or assistance in establishing a SSM+ User's account, contact Jim Deffler, NAWCAD Lakehurst, at (732) 323-1202 or DefflerJP@navair.navy.mil.
>
> *Step 3. SSM+ Parametric/Exception Analysis:* Once UUT test requirement data has been entered into SSM+, it can be mapped to ATE test capabilities for all ATS Families contained in the SSM+ database. A variety of reports can then be generated which identify how well each ATS alternative can support the UUT test requirements.

Cost and Benefit Analyses

To simplify the process of performing CBAs, the ATS EAO has developed an automated CBA tool in Microsoft Excel 5.0 format. Detailed instructions for using the CBA tool are contained in Attachment 3 of the DoD ATS Selection Process Guide which may be downloaded from the ATS EA Web Site (http://dodats.osd.mil). The CBA tool itself may be also be downloaded from the ATS EA Web Site (http://dodats.osd.mil/selprogd.htm). The CBA has two major components:

1. Qualitative Factors, Weights, and Analysis: The qualitative component of the CBA tool assesses the various ATS alternatives for ease of use, operational suitability, TPS transportability, upgradeability, age of ATS, vertical and horizontal commonality, life cycle supportability, ease of TPS development, and adaptability to meet emerging requirements or changing operational environments. A standard set of weights for the qualitative criteria used in the CBA have been established. Expected performances and confidence values for ATS Family members can be requested from the respective program office if required. To further support this request, the office submitting the policy deviation request is encouraged to provide for each option a qualitative back-up form and summary of pros and cons to assist the decision authority in evaluating the request.

2. Cost Factors: Investment and sustaining costs shown in the below table are considered in the CBA tool. Detailed descriptions of what these cost factors include are

provided in Attachment 3 of the DoD ATS Selection Process Guide along with back-up data forms to support all costs.

Cost Category	Required for PDR LCC and Cost Benefit Analyses	Required for CTAVR
1.0 INVESTMENT COSTS		
1.1 ATE Development (NRE)	Yes	**No** Note 1
1.2 ATE Production	Yes	Yes
1.3 TPS Development	Yes	Yes
1.4 TPS Production	Yes	Yes
1.5 Initial Training	Yes	**No** Note 2
1.6 Interim Support	Yes	**No** Note 2
1.7 Initial ATE Support/ Maintenance Acquisition	Yes	Yes
2.0 SUSTAINING COSTS		
2.1 Manpower	Yes	**No** Note 2
2.2 Sustaining Training	Yes	**No** Note 2
2.3 ATE Support/Maintenance	Yes	Yes
2.4 ATE In-Service Engineering	Yes	Yes

Note 1: ATE Development costs are sunk for DoD ATS Family testers and should not be incurred for commercial testers.

Note 2: These costs have typically been insignificant factors in previous CTAVRs and are not required. These costs may be included at the option of the office preparing the CTAVR.

Contracting for an ATS

Other than the fact that an ATS is an item of support equipment and not a weapon system, an ATS acquisition is basically just another acquisition. The acquisition typically includes some or all of the following items:

- The ATE
- Test Program Sets for the items to be tested on the ATS
  - Tools to be used by TPS developers
- Logistics support for the ATE
- Logistics support for the TPSs

DoD policy relevant to the use of specifications and standards is just as applicable to an ATS acquisition as it is to a weapon system acquisition.

If the ATS selection process described above yields a solution which requires design and development of a new or unique ATS, the PM will be faced with competing the acquisition (or justifying a sole source award) just as would be the case were this a weapon system acquisition. Expect to develop the standard acquisition documents which may include CBD announcements, Justification & Approvals, RFPs, Source Selection Plan, ILS documentation, Technical Manual

Contract Requirements, Test & Evaluation Master Plan, Environmental Compliance documentation, etc.

Depending on the scope of the Test Program Set acquisition involved and the availability of technical UUT data, competition normally produces a better product at a lower cost than simply awarding this work to the developer of the ATS or to the weapon system prime contractor.

The PM should work closely with the SYSCOM ATS Office for all ATS and TPS acquisitions.

Test and Evaluation of ATS

DoD 5000.2-R requires a TEMP for ACAT I and IA programs, and other programs designated for OSD test and evaluation oversight. Although an ATS acquisition is normally well under the thresholds which would require that a TEMP be developed, sound program management of an acquisition of an ATS that is not already in Service elsewhere in DoD would include a Test and Evaluation program.

The objective of the T&E portion of the ATS acquisition is to ensure that the ATS is suitable for use in its intended environment and is logistically supportable.

An appropriately tailored TEMP should be developed to document the overall structure and objectives of the test and evaluation program. The TEMP will provide a framework within which to generate detailed test and evaluation plans and it documents schedule and resource implications associated with the test and evaluation program.

The PM can charter an IPT to develop, manage and conduct the T&E of the ATS being acquired.

A sample TEMP outline suitable for an ATS acquisition can be obtained from the DoD ATS Executive Agent Office (rosswa@navair.navy.mil).

Controlling Costs

Costs for ATS acquisitions are typically divided into "non-recurring" (development) and "recurring" (production), and support. Selecting a DoD ATS Family or a COTS ATS significantly reduces the potential for high development costs for the test equipment itself. Additionally, using a DoD ATS Family keeps production costs relatively lower due to the economies gained by ordering in larger quantities. COTS ATS offers the inherently lower production costs gained from buying off-the-shelf items. Similarly, life cycle logistics support costs are lower with a DoD ATS Family or a COTS ATS solution for these same reasons.

The TPS usually is unique to each WRA/SRA being supported and may have relatively high development costs. It is not uncommon to see non-recurring TPS costs of several hundred thousand dollars up to $1M for a WRA TPS, depending on the complexity of the unit being tested. SRA TPS development can cost up to $100K. The cost impact to a program can be significant if a large number of units must be tested. The PM will obtain the most cost-effective results by forming an IPT to manage the TPS acquisition. It should include representation by his/her SYSCOM ATS Office.

Life-cycle costs of supporting the ATS and the associated TPSs can be significant. A logistics manager should be part of the PM's ATS acquisition team from inception, and part of his/her mission should be to ensure that life cycle cost drivers are identified, and that the system is designed to minimize life cycle costs.

Essentially, the single most important way to control ATS costs is by relying on the ATS acquisition experience available in the Navy SYSCOMs and in the DoD ATS EAO. The staff in these offices has been involved in many ATS acquisitions, understand all the cost elements involved, and have experience in minimizing cost to the individual program. Some specific techniques that can be useful in keeping ATS costs down are:

- Buying equipment which is already in DoD inventory
- Buying commercial equipment that is truly off-the-shelf and needs no additional design and development work
- Not designing any new ATE
- Modifying existing test programs for use on similar or related UUTs
- Including several years of options in production contracts
- Minimize organic support infrastructure for the tester and test software
- Reduce cost of spares by planning to have support in place for the ATS when the equipment is fielded
- When buying a COTS ATE, accept the contractor's logistics recommendations with little or no "reinventing the wheel"
- Include in the production contract a clause specifying FAR 52.217-7 Option for Increased Quantity - Separately Priced Line Item. This will provide flexibility in case additional units need to be bought later on
- Negotiate a warranty with the ATE purchased
- Consider buying COTS ATE and TPSs off of the GSA schedule (some industry companies are now available through GSA schedule)

Lessons Learned

Useful information and lessons learned relative to ATS acquisition may be found at http://pma260.navy.mil/ats/cass/tps/dgar/lessons_learned/lessons.dbm.

6. Test Program Set Acquisition Processes and Procedures

TPS Acquisition Process

Planning for TPS acquisition begins early in the acquisition cycle for the weapon system or the UUT. Testability requirements are evaluated and included in the UUT procurement contract. BIT/BITE requirements are also identified in the acquisition contract.

The need for a Test Program Set is determined by a support requirements analysis (usually a Level of Repair Analysis - LORA), an analytical process to determine whether a failed item should be repaired or discarded. The key elements are the unit's reliability and its cost. There is obviously no need to develop a test capability for a low cost item with a very high Mean Time Between Failure. Conversely, an expensive item which has a low MTBF will almost certainly require that a test and repair capability be implemented.

There are two major challenges in a TPS development effort:

1. Obtaining the unit to be tested in the proper configuration. A typical problem encountered when developing test software for new or modified items is that the item’s design changes until the very last minute, at which time users expect the TPS to be delivered. Test software development requires an item with a stable configuration and adequate lead-time to develop the software that matches it. Additionally, provisions must be made for repair of the unit when a failure occurs during the TPS development process.

2. Assembling the data needed by the TPS developer. This usually includes drawings and schematics, theory of operation, avionics prime item specifications, technical manuals, BIT data, test requirements documents, failure modes and effects report, and historical operational data.

The typical TPS procurement may have the following major milestones:

- Preliminary Design Review
- Critical Design Review
- Quarterly Program Reviews
- Test Readiness Review
- First Article Test
- TechEval
- Production Acceptance

The actual TPS development process ordinarily includes the following steps:

- Detailed test design
- Interface Device design
- Coding and compiling
- Integration
- Acceptance testing

Given the technical complexity of the TPS acquisition process, the PM's first step should be to contact the SYSCOM's ATS Office for assistance and guidance throughout the entire acquisition. Management of the acquisition of CASS TPSs will be performed by PMA-260. Appendix 4 provides an overview of a typical TPS development process.

Red Team Package

The Navy has developed a standard TPS acquisition Statement of Work package named the Red Team Package (RTP) for the design, development, demonstration, and production of CASS Operational Test Program Sets (OTPSs), including hardware, software, data, and documentation. The product of several years experience with hundreds of TPS acquisitions, it is tailorable for any TPS acquisition (CASS or non-CASS). The RTP provides a performance-based specification, a tailored LSA, CALS-compliance, acceptance test procedures, and a full TechEval. For a CASS TPS acquisition, it provides for verification of transportability among the different configurations of CASS.

The Red Team Package and other TPS information may be downloaded from the Navy OTPS Red Team Home Page at http://pma260.navy.mil/ats/cass/tps/rt/rt.html-ssi.

By way of overview, major sections in the RTP are:

- General
- Program planning and control
  - Reliability program
  - Maintainability program
  - Safety program
  - Quality assurance system
  - Configuration management program
- OTPH nomenclature and serial number
- Parts control program
  - Review and approval of unapproved parts
- Contractor training
- Technical information
  - Contractor's progress, status, and management reports
    - Engineering support data (ESD)
    - Test program set document (TPSD)
    - Source/object code
  - Integration
    - Integration logbook
    - Integration fault insertion
  - Data accession list
  - Technical data packages (TDP)
- Program and design reviews
  - Post award review (PAR)
  - Quarterly program reviews (QPRs)
  - OTPS preliminary design review (PDR)
  - OTPS critical design review (CDR)
  - Test readiness review (TRR)
- Acceptance testing

First article test (FAT)
Technical evaluation (TECHEVAL)
Production acceptance testing
OTPS on-site verification requirements
CASS equipment and services
CASS assets
Off-station software
CASS maintenance and repair
UUT equipment and services
UUT assets
UUT source data
UUT maintenance and repair
ATPG
System problem reports (SPRs)
Engineering/technical services and sustaining support
Engineering and technical services
Sustaining engineering support
Interim logistics support
Technical document distribution statements
Marking data
Distribution statements
Technical data
Contractor performance evaluation
Classified documents
Destruction notice
Unclassified data
Classified data

For questions about the Red Team Package, contact the project manager, Ed Holland, NAWCAD Lakehurst at (732) 323-1929 or via e-mail at Holland@navair.navy.mil.

CASS TPS Development Training

The CASS TPS Developers Guide and the following manuals are available on-line at http://198.154.24.68/cass/thg.htm.

- CASS User's Guide for TPS Developers (T00K) (23 Sep 98)
- CASS Station Interface and GPI Pin Out Data (20 Nov 96)
- Prime Item Development Specifications for CASS (22 Jun 98)
- Software User's Manual (SUM) for the Support Software (SUPR) (25 Jul 97)
- Tailored Version - SUM for the Station Control Software (SCSW)(25 Jul 97)
- Tailored Version - SUM for the Intermediate Maintenance Operations Management System (IMOM)(25 Jul 97)

Lockheed Martin Corporation, the developer and prime manufacturer of CASS, offers a number of CASS training courses:

- CASS Familiarization Course
- CASS Hardware Familiarization Course
- CASS Atlas Programming Course
- CASS Core Programming Course
- CASS RF Programming Course
- CASS CNI Programming Course

For further information on these courses, visit the Lockheed Martin CASS web site at http://www.lmco.com/cass.

TPS Procurement Checklist

The checklist in Appendix 5 is suggested for use by decision-makers in planning TPS acquisitions.

Test and Evaluation of TPS

As with any acquisition, Test Program Sets must undergo a test and evaluation program. Typically, T&E for TPSs consists of:

- First article testing of each TPS/OTPS by the contractor
- Technical evaluation (TECHEVAL) by the government at a government facility
- Production acceptance testing for each TPS/OTPS by the government supported by the contractor
- OTPS on-site verification by the government with support by the contractor

NAVAIR has established a policy for all TPSs to pass a formal TECHEVAL (per the Red Team specification), using fleet sailors and marines, prior to fleet use. As a result, every element of the total CASS support "system" will contribute optimally to the supportability and life cycle cost of the weapon system. Figure 5 illustrates the OTPS Red Team Process.

TPS Costs

Standard TPS Cost Management System

The Standard TPS Cost Management System (STCM) is an integrated model suite being developed jointly by NAWCAD Lakehurst, NADEP Jacksonville, NAWCWD Point Mugu, and Test Automation Incorporated (TAI) to provide DoD Program Managers with a tool to provide consistent TPS acquisition planning, scheduling, cost estimating, and management across any Automatic Test System (ATS) platform such as CASS. STCM will provide the DoD TPS program manager with the following:

- A valid and defensible system to provide improved TPS cost estimating and forecasting.

– An accurate, repeatable, and traceable system for proposal assessment (cost realism) and change assessment.
– A system for tracking TPS development contracts and identifying improvement areas for the TPS development process.

STCM is being developed through the integration of the following existing ATE/UUT analysis and TPS cost estimating models:

Lakehurst System Synthesis Models (SSM+). SSM+ provides an automated tool for mapping a weapon system's test requirements to the test capabilities of a target ATS platform. Limitations of the ATS platform to fully support the weapon system help provide an assessment of anticipated Interface Device (ID) complexity and cost.

Jacksonville Auto-ID Merge Model. The Auto-ID Merge Model provides a tool to objectively calculate OTPS groupings and provides an accurate and consistent method of identifying ID complexities and quantities for a given set of UUTs. An iterative mode allows the user to "fine-tune" OTPS groupings based on user knowledge (workload, for example) and re-calculate ID complexities.

Jacksonville Should-Cost Model. The Should-Cost Model provides a tool to estimate TPS production costs and government oversight costs during the execution of a TPS development contract.

Test Automation Cost, Assets, & Schedule Prediction Evaluation Routine (CASPER). CASPER consists of a UUT Complexity Module, Schedule & Assets Module, and Cost Module designed to provide the TPS program manager with a project planning and cost estimation tool for TPS development. CASPER includes a Task Update Editor (TUE) which provides the ability to edit individual task contributions to a detailed TPS development Work Breakdown Structure (WBS)

STCM applicability to the DoD Program Manager will be as follows:

– STCM's capability to generate detailed TPS cost estimating reports down to five WBS levels will not only allow the government program manager to prepare budgets to fund TPS development and production contracts as well as associated government oversight efforts, but more importantly will provide him or her with the ammunition necessary to defend these budgets. Additionally, these detailed reports will provide a baseline that can be compared to any contractor Cost/Schedule Status Reports that might be available to the program manager and used to help track the health of his or her TPS program.

– The ability to play "What-If" games will provide an invaluable service to the program manager during all phases of a TPS contract. STCM will allow for rapid cost and schedule assessment of contract changes and "What-If" scenarios such as: UUT late deliveries, ATS/CASS availability and downtime variations, multiple shift operations, program review and data item variations, and different OTPS assignments,

– Once a TPS contract is awarded, STCM could be used to assess the cost and schedule impact of any unforeseen events, such as the late delivery of ATE or UUT government furnished equipment. With an original and revised cost report down to the fifth WBS element in-hand, the program manager will be better prepared to negotiate any claims received against his or her program.

STCM is currently in development with the initial Baseline 1 release expected to be deployed over the World Wide Web in FY00. Continuous improvements to STCM will result from on-going TPS cost data collection and analysis efforts. For more information on STCM or assistance in developing TPS cost estimates, contact Jim Deffler, NAWCAD Lakehurst, at (732) 323-1202 or e-mail DefflerJP@navair.navy.mil.

NAWCAD LKE TPS Cost Study

A May 1997 study by NAWCAD Lakehurst shows that TPS cost drivers are typically as follows:

Hardware	30%
Sys Eng/Prog Mgmt	17%
Integration & Debugging	13%
Software	11.5%

Other important findings from this study were:

- Common hardware solutions applicable across multiple programs could yield significant savings (common IDs, adapters, & fixtures)
- New software development tools could potentially reduce software and integration & debugging costs (25% to 50% improvement could yield 6% to 12% total savings)

Lessons Learned

Useful information and lessons learned relative to TPS acquisition may be found at:

Standard TPS Procurement Package	http://pma260.navy.mil/ats/cass/tps/rt/rt.html-ssi
TPS Design Tools	http://spectra.crane.navy.mil/cass/tpsdx/tpsdx.html
TPS TechEval	http://casstps.nawcad.navy.mil/
Commercial TPS development tools	http://pma260.navy.mil/ats/tools/index.html

7. CASS Acquisition Processes and Procedures

Any potential acquisition of CASS should begin by contacting the CASS project officer, CAPT (Sel) Mark Czarzasty, NAVAIR PMA-260D3, at (301) 757-7944.

CASS Hardware Acquisition

Upon initial inquiry, PMA-260 will provide a representative to the weapon system IPT. The WS IPT will provide technical and workload requirements to NAWC AD LKE for input to the SSM+. Requirements from fleet activities must trace to the official Weapon System Program Document (WSPD) or to the system's Required Operational Capabilities/Projected Operating Environment (ROC/POE) document.

The SSM+ will generate the quantity and configuration of CASS stations required to satisfy the requirement.

To acquire the CASS stations, the weapon system PM will forward the necessary funding documents to PMA-260. CASS stations for NAVAIR-managed weapon systems are funded from PMA-260's APN-7 common ground equipment account. Others are funded with the appropriate funds. PMA-260 will add new station requirements to CASS production contracts and track the requirements in the CASS Implementation Plan.

CASS Implementation Plan

The CASS Implementation Plan (CIP), http://pma260.navy.mil/ats/cass/cip/, published on a continual annual basis, is an ongoing effort to ensure:

- the timely introduction of emerging weapon systems support to CASS;
- the coordinated offload of currently fielded TPSs to CASS and retirement of existing ATE.

The CIP uses computer software tools to track TPS development, delivery schedules, workload requirements and CASS delivery schedules to produce a CASS allocation schedule. This allocation data is then subjected to PMA-260 management constraints (such as CV availability, expected deployment requirements, and near term fleet priorities) and sorted by delivery date, site and TPS program. This data is then used to produce attachments 1 through 4 of this document.

CASS workload requirements are developed using SSM+. The SSM maintains a library of the parametric testing requirements of each unit under test (UUT) and which CASS instrument assets and configuration is needed. Operational requirements including aircraft type and quantity, projected flying hours, UUT reliability, UUT elapsed maintenance time (EMT), mean time between unscheduled maintenance actions (MTBUMA), and CASS operational availability are fed into the SSM+ resulting in CASS workload data. The workload data is used to create station sharing arrangements for each site resulting in the optimum mix of CASS to meet the expected requirements.

CASS Installations, SHIPALTS and MILCON

CASS station shipments and installations are funded by NAVAIR for all GFE station deliveries and performed by a NADEP installation team. All fleet installations are intended to be "turn-key" to minimize impact on operating activities. Site surveys will be performed 2-3 years prior to installation and final site evaluations will be performed approximately 90 days prior to delivery. Installation team responsibilities include installing deck rails (ashore), station mounting, supervision of power hookups, station energizing, and successful completion of calibration and self-testing, including resolution of any failures. The team leader and the receiving site representative co-sign the certificate of completion.

PMA-260, PMA-251, NAWC AD Lakehurst and NAVSEA PMS-312 coordinate CASS SHIPALTs, from design sketches by Lakehurst, to detail drawings by the planning yards, to actual completion of modifications for CASS hotel services, cables and foundations. PMA-260 and PMS-312 fund all stages of CASS SHIPALTs for CVs, via PMA-251. AIMDs are encouraged to monitor SHIPALT progress and input AIMD/ TYCOM preferences for station locations early in the planning. CASS stations are almost always installed during a major shipyard availability (PSRA, new construction, COH, etc.) to enable cutting holes, phased removal of old ATE, addition of power and air services, and installation of CASS stations. Numerous CASS SHIPALTs will be completed in the same ship availability period. The number of CASS installed during an availability is based on the expected workload when the ship returns to sea. For planning purposes, the CIP identifies the beginning of the shipyard availability as the targeted station delivery date. Actual station installation is coordinated between PMA-260 and the shipyard.

The NAWC AD Lakehurst site activation team leader also coordinates shore site activation planning. The Lakehurst team will submit all site activation plans to the AIMD for comment and suggestions. Final CASS installation plans (with required facility modifications) will be submitted back through the AIMD for submittal to PWC via the ROICC. PMA-260 is responsible for funding only those facility requirements peculiar to CASS installation/operation (i.e., air conditioning, power) but the AIMD needs to track and coordinate the facility upgrade project. Constant communication between PMA-260 and the AIMD is vital. Any MILCON requirements, including funding, must be initiated and coordinated through the ROICC, PWC and the TYCOM by the AIMD. AIMD officer coordination with the NAVAIR CIT Leader will help to ensure a smooth transition.

Site Activation Planning Guide

Site Activation Planning Guides (SAPGs) are developed for maintenance officers at each site scheduled to receive CASS stations. SAPGs are intended to give the information needed to plan for and expedite the CASS activation at that particular site. They will be tailored to the specific site and include all station and TPS delivery schedules. They will also provide a maintenance officer's CASS checklist and points of contact to enable the fleet user to monitor and assist with CASS implementation as it applies to the specific site. SAPGs will be sent out to fleet activities and TYCOMs as they are completed and will be updated semi-annually.

Navy Working Capital Funded (NCWF) activities

Prior to May 1994, PMA-260 budgeted and funded the procurement of CASS stations to meet requirements for NCWF activities, such as the NADEPs, in-service engineering activities (FSTs) and NSWC Crane. These requirements were removed from the CIP commencing with FY94 procured (lot 4) stations per NCWF legislation. The responsibility for funding the procurement of CASS stations for NCWF sites now rests with each DBOF activity. Subsequent requirements, with the exception of newly introduced platforms, are now being tracked and filled in the CIP as each activity capitalizes CASS using NCWF funds.

Per the DoD Financial Management Regulation: "Purchase and installation costs for the initial procurement of any and all depot maintenance capital equipment unique to newly introduced platforms or weapon systems will continue to be funded in the appropriate procurement account. Once transferred to or otherwise capitalized by the depot, the capital equipment becomes the property of the depot. The depot will treat the equipment as a capital asset, depreciate the equipment, and fund subsequent replacement and maintenance of the equipment in its capital and operating budgets in the fund."

Marine Corps CASS Requirements

The following is a brief explanation of the different types of CASS mobile facility deliveries to fixed and rotary wing Marine Air Logistics Squadrons (MALS):

MF Type	Aircraft Supported	Explanation
CCSP	F/A-18, MV-22, AV-8B, & EA-6B	Common Contingency Support Package (CCSP) for a notional air wing of all fixed or common rotary wing types. CCSPs receive CASS plus all common TPSs.
PCSP	Each fixed/rotary wing type	Peculiar Contingency Support Packages (PCSP) containing PSE (includes peculiar CASS TPSs)
TSA	F/A-18, AV-8B	Training Squadron Allowance (TSA). Replacement training squadrons. Receive CASS plus all common and peculiar TPSs.
FOSP		Follow-on Support Package (FOSP). Receive CASS plus all common TPSs.

CCSPs require station quantities and configurations based on Air Combat Element (ACE) workload, not just the types and quantities of aircraft at the specific MALS. If a CCSP is deployed it must have all the capabilities to support the types of aircraft that are deployed with it. Common TPSs are delivered to each CCSP, while platform-peculiar TPSs are delivered to appropriate PCSPs. CASS stations are never included in a PCSP, but are delivered to CCSPs, TSAs, and FOSPs.

There are two types of CCSPs: fixed wing and rotary wing. CCSPs each contain an identical mix of CASS stations (8 at fixed wing MALS and 4 at rotary wing MALS) and CASS TPSs for common programs. The planned CCSP station and TPS combinations will be capable of deployed support of an ACE. The fixed wing ACE consists of 20 AV-8B, 36 F/A-18A-D, 5 EA-6B and 6 C-130 aircraft. The rotary wing CCSP will support 20 MV-22 aircraft commencing in 2002.

When the CCSP is deployed, the FOSP and TSA remain behind to support any aircraft remaining at the parent MALS. A MALS will only have CASS stations and common TPSs in the FOSP when workload for all the aircraft located at a site, not including the TSA, exceeds the workload for a CCSP. The TSA contains CASS stations and a full suite of common and peculiar CASS TPSs needed to support onboard training aircraft. The NAVAIR MALSP IMRL Guide Rev A dated 4/1/96 identifies the most current CCSP, PCSPs, TSA and FOSP located at each MALS. The type/quantity of aircraft at each MALS is also shown. Custody Coded PCSPs do not require TPS support. PMA-260 is working closely with CMC, the Program Managers, and SETLs to ensure the requirements are met.

The station delivery dates listed in the CIP attachments show the date a MF installed with a CASS station is required to be in place at a MALS. CASS stations must be delivered to NADEP NORIS 3 months prior to this "need date" for CONUS MALS and 6 months prior for MALS-12 Iwakuni to allow time for, first, CASS installation in the MF, and second, shipment of the MF to the MALS site.

CASS Support

CASS is fully funded and supported in the fleet. User Logistic Support System (ULSS) plans are delivered to each site approximately six months prior to the first station delivery, per the latest CIP. ULSS plan preparation begins with a site visit to assess any site-specific issues, and to address supply support, personnel and training, support and test equipment, technical publications, and facilities.

Manpower and Training

Two Navy NECs for CASS have been established: AT/ET-6704, Operator Maintainer, and AT/ET-6705, Calibration/Advanced Maintenance Technician. The Marine Corps has established just one MOS: 6467, Operator/Maintainer/Technician. Currently, the Operator Maintainer class is 7 weeks in length and the advanced calibration class is an additional 4 weeks. The training concept's basic premise is that the skills required to operate and maintain the CASS station using Support of Support (SOS) TPSs are the same skills required to operate and maintain weapon system UUTs using UUT TPSs. As more weapon system TPSs are delivered, operator training will also provide hands-on experience testing a representative sample of WRAs/SRAs selected from the offload and emerging programs.

CASS Logistics Support

The CASS Assistant Program Manager for Logistics (APML) heads an ILS management team which provides for the full range of logistics support for CASS. Contact Barbara Long, the CASS APML at (301) 757-6886 for specific details on supporting CASS.

Appendix 1: CASS and RT-CASS Technical Data & Specifications

The CASS Prime Item Specification can be downloaded at http://198.154.24.68/cass/spec/b01c00.htm. The following information in this appendix summarizes the major features of the various configurations of CASS. For details, refer to the Prime Item Specification.

CASS Hybrid Station basic test capability

- General purpose electrical/ electronics
- Computers
- Instruments
- Flight controls
- UUT Discrete Status Monitor
- Pneumatic subsystem (ancillary equipment)

Physical Characteristics

5 Racks
84" (H) x 120" (W) x 34" (D)
4304 Pounds

Operating Characteristics

Operating Temperature:
+10o C to +26.6o C
Input Power:
110/220 Vrms
440/480 Vrms
3-phase, 3-wire

Control Subsystem

133 MHz DEC Computer
64 Mbytes memory
2.1 Gbytes fixed disk
1.3 Gbytes read/write optical disk
Keyboard, trackball, barcode reader
16-inch diagonal electro-luminescent display
Station power and environment monitor/control
Self-test and diagnostics
On-line training and diagnostic manuals

General Purpose Interface

1486 usable pins
Latching mechanism for holding the UUT ID

Instrumentation I/O brought directly to pins
User configurable switching available to TPS designer
GPI pin definition standardized across all CASS configurations to ensure TPS transportability

Digital Test Unit

Programmable logic levels –5V to +15V
384 bi-directional stimulus/ response channels, expandable to 512
50 Mbits/sec stimulus/response data rate
25 MHz clock rate
64K memory depth per channel
20 ns pulse detection
Dynamic fault dictionary with data acquisition RAM
Remote probe 0 to 50 MHz

UUT Power Supplies

DC Programmable (800 W)
(8) 0 to 32V at 25A
(1) 0 to 100V at 8 A
(2) 50V to 400V at 2A
AC Programmable (4)
1 to 135 Vrms at 4.5 A max
55 to 1200 Hz
1, 2, or 3 phase

Digital Multimeter

6 ½ Digit Resolution
Volts:
200 V at GPI
0 to 1000 VDC probe
0 to 700 Vrms probe
Current:
0 to 2A ac/dc
Resistance:
0 to 30 Megohms

Frequency Time/Interval Counter

2 Channels
DC coupling 0.001 Hz to 200 MHz
AC coupling 100 Hz to 200 MHz
Time Interval: 4 ns to 15,000 sec
Period:
Channel A - 5 ns to 1000 sec
Channel B – 10 ns to 1000 sec
Max count event rate: 20 MHz
Input Voltage: + 10 Vp DC
Sensitivity: 0.1 Vpp

Waveform Digitizer

0 to 500 MHz
4 Channels (2 at GPI, 2 external)
Vertical Voltage at GPI: 8 mV to 40 V full scale
Maximum input voltage: 5 Vrms (50 ohm input)
Maximum sample rate: 20 mega samples/sec
Memory depth: 1024 points
Waveform Types as follows:
DC, Sine, Square, Step, Triangle and Pulsed DC

Low Power Wattage Load

Range: 1.5 to 99,999 ohms
Increments: 0.1 ohm
Power dissipation: 5 watts

High Power Wattage Load

Programmable ranges:
0 to 20 Amps
1 ohm to 5 Kohm
Power dissipation: 500 watts
Unipolar DC only

Pulse Generator

Channels: 2
Operating modes: Continuous, Gated, Burst, and Trigger
Output Voltage: +100 mV to +5 V into 50 ohms
Pulse period: 4 ns to 99.9 ms
Pulse width: 2.0 ns to 89.9 ms
Pulse delay: 0 ns to 89.9 ms

Arbitrary Waveform Generator

Channels: 2
Amplitude: +5V
Maximum amplitude: 10 Vpp
0 to 25 MHz sine, pulse, ramp
48 Hz to 200 MHz arbitrary point generation
48 Hz to 100 MHz digital patterns (11 bit)
Rise/Fall time:
Channel A - 10 ns to 100 sec
Channel B - 30 ns to 100 sec
Minimum pulse width: 10 ns
Sweep Time: 1.4 us to 40 sec

Communication Buses

MIL-STD 1553 A/B
MIL-STD-1773
IEEE-488
RS-232
RS-422
IEEE-802.3
ARINC-429
MIL-STD-1397 (ancillary equipment)
RS-485/MH (ancillary equipment)

Switch Assemblies

Power switch (DC to 1000 Hz)
- (5) 1 X 4 ganged high current (18.75 A)
- (2) 1 X 2 ganged high current (18.75 A)
- (6) 1X 2 ganged low current (9 A)
- (1) 1X 2 high current (18.75 A)

LF switch (DC to 1 MHz)
- (21) 1 X 4 low frequency
- (35) 1 X 2 low frequency

Coaxial switch (DC to 1 GHz)
- (11) 1 X 4 coax
- (3) 1X2 coax

CASS RF Station

The CASS RF station provides the basic test capability of the CASS Hybrid station plus:

- Electronic countermeasures
- Electronic counter-counter measures
- Electronic warfare support measures
- Communication
- Spread modulation/demodulation (applies to CNI only)

Physical Characteristics

6 Racks
84" (H) x 144" (W) x 34" (D)
5473 Pounds

Spectrum Analyzer

Frequency range: 100 Hz to 22 GHz
Resolution bandwidth: 10 Hz to 3 MHz
Resolution Accuracy: +/- 20%
Video bandwidth range: 3 Hz to 3MHz
Sweep time range: 10 ms to 1000 sec
Input Power Range: 0 dBm max to -140 dBm
Pulse power:
100 watts peak
1% duty cycle
0 to 70 dB attn

Power Meter (2)

Waveform Types:
AC, AM, FM, PM, Pulsed AC & Pulsed DC
Frequency range:
100 kHz to 50 GHz
Power range: -70 to +44 dBm
Dynamic range: 50 dB in 10 dB steps
Selectable resolutions of:
1% (0.1 dB) of FS
0.1% (0.01 dB) of FS
0.01% (0.001 dB) of FS
(linear/logarithmic modes)

Microwave Transition Analyzer

Amplitude versus Frequency response:
DC to 26.5 GHz

+ 1.9 dB Max
Ratio amplitude range: 0 to 44 dB
Frequency Range: DC to 26.5 GHz
Nominal input impedance: 50 ohms
Noise floor: -44 dBm
Time scale trace length: 1024 points Max.
Input VSWR: 3.1 max @ <26.5 Ghz

40 GHZ Synthesizer

Frequency range: 10 MHz to 40 GHz
FM & pulse modulation
Frequency resolution: 1.0 Hz
Accuracy: + 1 x 10E-9
RF power output:
>10 MHz to <=2.3 GHz: +8.3 dBm
>2.3 GHz to <=40 GHz: -6.4 dBm
Minimum signal level: -100 dBm
Minimum settable resolution: 0.02 dB
Sweep time: 10 ms to 100 sec
Input VSWR: 3.0 max @ <= 26.5 GHz

High Power Synthesizer

Frequency range: 3 MHz to 20 GHz
AM, FM & pulse modulation
Frequency resolution: 0.4 Hz
Accuracy: + (1 x 10E-9)
RF power output (maximum): +18 dBm at 20 GHz
Minimum signal level: -100 dBm
Minimum settable resolution: 0.02 dB
Sweep time: 10 ms to 100 sec
Input VSWR: 2.0 max @ >12.5 GHz to 20 GHz

Synchro Generator/Measurement

Angular range: 0o to 360o
Resolution: 0.0055o
Accuracy: +/- 0.015o Gen
+/- 0.005o Meas
Line-to-line output voltage: 11.8, 26 or 90 Vrms
Accuracy: +/- 2%
Output frequency: 47 Hz to 1 kHz
Accuracy: +-0.5%
Voltage reference output: 26 or 115 Vrms at 1.5 VA
Accuracy: +/- 5%

Spread Spectrum

Video inputs:

200 mVpp to 5 Vpp
100 ohm impedance
Digital inputs:
Differential TTL
Differential ECL
Data rate 0.1 Hz to 10 MHz
Clock inputs: 0.1 Hz to 10 MHz
Outputs:
Differential TTL
Data rate 0.1 Hz to 10 MHz

Fast Switching Synthesizer

Frequency range: 10 MHz to 18.40 GHz
FM Hop Table
Frequency resolution: 0.1 Hz to 0.4 Hz max
Accuracy: + (1 x 10E-9)
RF power output:
10 MHz to 18.0 GHz: +3 to -100 dBm
>18 GHz to <18.4 GHz: 0 to -100 dBm
FM modulation rate: DC to 5 MHz
Sweep capability: Auto, single and step
Sweep modes: Sweep Up, Down and Sweep Up/Down

RF Switch Interface

Connector panel provides interface between the RF system and UUTs; provide routing and switching for RF I/O

Spread Spectrum Modulators & Demodulators (applies to CNI only)

Amplitude modulation:
Frequency range: 70 to 335 MHz
Modulation frequency: 10 Hz to 10 kHz
Pulse modulation:
Frequency range: 70 to 1300 MHz
MSK modulation: 5 Mbps max
Wideband FM discrimination: DC to 2 MHz
Narrowband FM discrimination: DC to 200 kHz
BPSK demodulation
TACAN Simulation
RF output frequency: 70 MHz to 1.3 GHz
MSK hopped frequency: 969 to 1206 MHz

CASS E-O Station

The CASS E-O Station provides the basic test capability of the CASS Hybrid station plus:

- Infrared systems
- Lasers/designators
- Laser range finders
- Visual Systems

Physical Characteristics

6 Racks
84" (H) x 160" (W) x 34" (D)
5454 Pounds

Operating Characteristics

Operating Temperature: +10o C to +26.6o C
Input Power:
110/220 Vrms
440/480 Vrms
3-phase, 3-wire

IR Sensor Test (MTF & SITF)

Mod. Transfer Function: 0.2 to 10 cycles/milliradian
Resolution: <0.2 cycles per milliradian
Signal Intensity Transfer Function: error < + 1.5 %

FLIR Sensor Test

Aperture: 10 inches max
FOV: 30 by 40 degrees max; 0.5 by 0.5 degrees min
Source spatial: 0.2 to 10 cycles per milliradian
Spectral bands: 7 to 12 micrometers

Television Vidicon Camera Measurements

Size: 1 X 1 inch max
Spectral band: 0.6 to 1.1 um
Video output: RS-343,RS-170, raw video
Effective source: (3.2 x 10E2) to (3.2 x 10E4) candela/meter2

Laser Transmitter

Maximum energy input: 300 millijoules
Minimum energy input: 30 millijoules
Aperture: 5 inch diameter max

Divergence: 200 to 820 microradians
Wavelength: 1.064 micrometers

Laser Receiver Measurements

Sensitivity range: 5 x 10E-10 to 5 x 10E-6 W / (cm2)(steradian)
Range gate: 0.5 to 10 km
FOV: 20 to 500 milliradians
Apertures: 0.5 to 5 inch diameter

RT-CASS test capability

- Low frequency stimulus
- Low frequency measurement
- Digital functions
- Specialized RF functions

These capabilities include stimulus, measurement, interface, control, calibration, self-maintenance, special instrumentation, and software functions necessary to perform end-to-end functional tests, fault detection, fault-isolation tests, and alignment or adjustment of units-under-test (UUTs).

Physical Characteristics

Individual transportable containers with maximum dimensions of 22.25"'W x 14.92"H x 30.00"D.
Individual containers, less internal assets, shall not weigh more than 88 pounds.
Capable of being installed by no more than two people, from start of set up to ready-to-test, in less than 8 hours
Enclosures are built to Lockheed Martin drawing 63E919394. Transit case shall have a finish color, olive drab no. 34088 per
FED-STD-595. External panels may be finished gold iridite.
Requires a 68.0"L x 32.0"W. solid flat smooth surface platform to be set up upon.

Transportability

In its shipping configuration, the station is transportable as internal air cargo. Each container is transportable with a maximum weight per transportable container not to exceed 150 pounds.

Mobile Facilities (MF)

The RT-CASS is deployable with 2 systems per double-wide MF or 1 system per single-wide MF.

Operating Characteristics

Operating Temperature:

Between 0 o C (32 o F) and 37 o C (100 o F), with a relative humidity up to 95 percent non-condensing at altitudes of zero (0) feet to
+5000 feet.

Station Cooling:

The station shall be ambient air-cooled and shall not require any externally forced cooling air.

Input Power:

Standard 230/400 Vrms 50 Hz European utility power or 120/208 Vrms 60 Hz U. S. utility power

Output Power:

200 VAC, 3 phase, 400 Hz or 115 VAC, single phase, 400 Hz using an external power converter

Control Subsystem

High performance embedded VXI computer system with 512 KBytes Cache and 64 Mbytes of system memory
Fixed Disk Drive >2 GBytes
Optical Disk Drive (Non-Volatile, e.g., CD-ROM/DVD)
Display - 16 inch, color, high resolution (1280 x 1024), Touch-screen, Guided Acoustic Wave (GAW)
Keyboard
Trackball or Touch screen Display
Printer - 120 cps minimum, Uses fanfold paper
Peripheral Interface
Elapsed Time Indicator
Ethernet
PCI Bus
SCSI Interface
GPIB Interface
Software-Windows NT
Serial Printer Interface

System Interfaces

IEEE-488 interface to control external ancillary equipment
Ethernet interface to the internal system control bus

Station Control Software:

Operating System (consists of several COTS (i.e. Windows NT, TYX/PAWS,) software products)
Operator Interface (OI)/Graphical User Interface (GUI)
Initialization
Utilities
Run-Time System (RTS)
Instrument Wrapper Interface
Instrument Driver Software
Station Test Software
Operator and system safety features

General Purpose Interface

350 usable pins

Latching mechanism for holding the UUT ID
Instrumentation I/O brought directly to pins
User configurable switching available to TPS designer

Digital Test Unit

Programmable logic levels -5V to +15V
192 bi-directional stimulus/ response channels, expandable to 432
50 Mbits/sec stimulus/response data rate
50 MHz clock rate
3 ns pulse detection

UUT Power Supplies

UUT DC power supplies
65 Vdc Power Supplies
120 Vdc Power Supplies
450 Vdc Power Supplies
UUT AC power supplies
135 VAC Power Supplies
400 Hz UUT power feed-through and monitor

UUT Interrupts

Quantity - 7
Input +15 Volt pull-up through 10K resistor
Signal Level - Active Low

Instruments

Low frequency instrumentation

Digital Multimeter
System Timing Generator
Frequency/Time Interval Counter
Waveform Digitizer
Arbitrary Waveform Generator
Low Wattage Power Load
High Wattage Power Load
Switch Assemblies
Digital Test Instrument
Digital-to-Analog Converter (DAC)
Analog-to-Digital Converter (ADC)
General Purpose Interface
Pulse Generator
Synchro Generator/Measurement

Communications interface instrumentation

RS-232-C

RS-422A
RS-485
IEEE-488-1978
IEEE-802.3 -1985
MIL-STD-1553B
STANAG 3910
ARINC 429-10

RF instrumentation

Spectrum Analyzer
20 GHz Synthesizer
20 GHz Synthesizer Modulation Source
Power Meter
RF Matrix Switch
2.4 GHz Signal Generator
Microwave Counter

Ancillary equipment

Printer
Video Pattern Generator
Pneumatics Function Generator

Accessory Equipment

DMM Probe
Oscilloscope Probes
High Voltage Probe
DTI Probe
RF Power Sensors

Digital Multimeter

6 1/2 Digit Resolution
Volts:
0 to +300 Vdc at GPI
0 to ±1000 Vdc using external probe
0 to 200 Vrms at GPI
0 to 700 Vrms using external probe
100 kHz maximum
Current: 0 to ±2 A at GPI
Resistance: 0 to 100 Megohms

Frequency Time/Interval Counter

2 Channels
DC coupling 0.001 Hz to 200 MHz
AC coupling 10 Hz to 200 MHz
Time Interval: -2 nsec to 8x105 Sec

Period:
Channel A - 5 ns to 1700 sec
Channel B - 6.25 ns to 1700 sec
Sensitivity: 75 mVpp: 5 Ns Pulse Width

Waveform Digitizer

0 to 250 MHz bandwidth
4 Channels, 2 probes
19 automatic pulse parameter measurements
Vertical Voltage at GPI: 10 mV to 100 V full scale
Maximum sample rate: 1 giga samples/sec

Low Power Wattage Load

Range: 1.5 to 99,999 ohms
Increments: 0.1 ohm
Power dissipation: 5 watts

High Power Wattage Load

Programmable ranges:
0 to 20 Amps
1 ohm to 5 Kohm
Power dissipation: 500 watts

Pulse Generator

Channels: 2
Operating modes: Continuous, Gated, Burst, and Trigger
Frequency 10 Hz to 300 MHz
Pulse period: 3.3 ns to 100 ms
Pulse width: 1.5 ns to (period -1.55 ns)
Pulse delay: 0 ns to (period - 1.5 ns) delay from trigger

Arbitrary Waveform Generator

Channels: 2
Amplitude: +5V
Operating Modes: 7
Maximum amplitude: 32 Vpp (open circuit)
100 m Hz to 50 MHz sine
100 m Hz to 1 MHz pulse, ramp
Arbitrary waveform generation: Vertical Resolution 12 bits (4096 points)

Communication Buses

MIL-STD 1553 A/B
MIL-STD-1773
IEEE-488

RS-232
RS-422
IEEE-802.3
ARINC-429
MIL-STD-1397 (ancillary equipment)
RS-485/MH (ancillary equipment)

Switch Assemblies

Power switch: (8) 1 X 2 high current
LF switch: (50) 1 X 2 low current
Coaxial switch: (10) 1 X 4 coax, (16) 1 X 2 coax

Synchro Generator/Measurement

Synchro/Resolver Generation

Range resolution 0.0027 degrees
Angular rate -1000 to +1000 degrees/sec

Synchro/Resolver Measurement

Resolution 0.0055 degrees (16 Bit mode), 0.00035 degrees (20 Bit mode)
Angular Rate: 16 Bit mode ± 1000 degrees/sec, 20 Bit mode ± 62.5 degrees/sec

Digital-to-Analog Converter

16 D/A Channels, 16 bits/Channel
Output Voltage Ranges ± 20.0 V, ± 10.0 V
Output Current ± 50 mA per channel
Memory 512K words

Analog-to-Digital Converter

1 Channel, 16 Bits
Input voltage +/- 40 V
Input Impedance 10 - 400 megohms

Spectrum Analyzer

Frequency range 100 Hz to 22 GHz
Resolution bandwidth
Range (-3dB) 10 Hz to 3 MHz adjustable in 1,3, sequence and 10% increments
Accuracy ± 20%
Sweep time range 10 ms to 1000 sec
Power Input Range (with preamplifier) -20 dBm max to -160 dBm (maximum input reference level < -30 dBm)

Power Meter

Measures average power of AC, DC, AM, FM, Pulsed PM, Pulse AC waveforms
Frequency range - 100 kHz to 50 GHz (with appropriate sensor)
Power range -70 to +44 dBm (100pW to 25 W) (sensor dependent)

RF Interface/Coax Switch

Switch any one of four input ports to any one of 4 output ports
Maximum power rating - 1.0 Watt CW
Maximum switching speed - 15 ms per element
Insertion Loss (dB) - 0.9 (<2 Ghz), 2.7 (@18 Ghz)
VSWR 1.5:1 @ 18 Ghz

20 GHZ Synthesizer

Frequency range 10 MHz to 20 GHz
Frequency resolution 1.0 Hz
Accuracy ± (1 x 10-9)
RF output power -90 to + 13 dBm

Signal Generator

Frequency range 9 kHz to 2.4 GHz
Frequency resolution 1.0 Hz
Accuracy ± (1 x 10-9)
RF output power - FM
  < 1.2 GHz -127 dBm to +25 dBm
  > 1.2 GHz -127 dBm to +19 dBm
RF output power - PM
  < 1.2 GHz -127 dBm to +20 dBm
  > 1.2 GHz -127 dBm to +14 dBm
RF output power - AM
  < 1.2 GHz -127 dBm to +10 dBm
  > 1.2 GHz -127 dBm to +4 dBm

Frequency Counter

Input impedance 50 Ohms
VSWR < 3:1
Frequency measurement Range 500 MHz to 20 GHz
Sensitivity
  < 12.4 GHZ -30 dBm
  < 20 GHz -20 dBm

Video Pattern Generator

Formats: digital, National Television Systems Committee (NTSC)/PAL, and Red-Green-Blue (RGB)
Horizontal Timing
  Frequency 3 – 130 kHz
  Resolution 1 Hz

Total pixels/line 290 – 4096 in 2-pixel steps
Vertical Timing
Frame rate 1 - 650 Hz

Pneumatics Function Generator

Two pressure outputs (static and total) and one additional pressure monitor channel (total)
Static pressure
Calibrated range - 2000 feet below sea level to 85,000 feet above sea level (0.645 to 32.148 inches Hg)
Accuracy - 32.148 inches Hg > programmed altitude >0.645 inch Hg +0.006 inch Hg
Resolution 0.001 inch Hg (static pressure)
Total pressure
Calibrated range 0.6 to 100 inches Hg absolute
Accuracy -
No deviation from programmed values by an amount greater than +0.006 inch Hg from 0.6 to 35 inches of HgA and +0.0246 inch Hg between 35 and 100 inches HgA
Resolution 0.001 inch Hg

Appendix 2: Commercial Tester Acquisition Validation Request

Point(s) of Contact:	
Name:	**Phone:**
Activity:	**E-mail:**
Tester Description (Attach Commercial Specification Data Sheet if available):	
Manufacturer:	**Model Number:**
Type of Tester: (Analog, Digital, RF, EO, etc)	
Instrument List: (DMM, O-Scope, Counter/Timer, etc)	
Tester Application:	
Weapon System(s):	**Maintenance Level(s):** (O / I / D / F)
No. of WRAs/LRUs:	**No. of SRAs/SRUs:**
Weapon System Support Date: (ATE/TPS Need Date)	
(1) Show that the tester meets the commercial item definition in the DFAR:	
Is the tester regularly used for other than Government purposes and sold or traded in the normal course of business? (Yes / No)	
Example of a Commercial Application:	**Example of a Government Application:**

(2) Show how the tester provides a more economical solution than a DoD ATS Family tester:

Costs	**Commercial Tester**	**"Closest Fit" DoD Family Tester**
ATE Acquisition		
ATE Support/Maintenance Initial Acquisition		
TPS Development		
TPS Production		
ATE Support/Maintenance		
ATE In-Service Engineering		
TOTAL COSTS		

(3) Show how the tester meets each defined DoD ATS Critical Interface (CI):

(4) Other than TPS Development efforts, identify all non-recurring costs associated with this acquisition:

Appendix 3: DoD Non-Standard ATS Policy Deviation Approval Form

From: Program Manager, ___________________
To: Assistant Secretary of the Navy (Research, Development and Acquisition)
Via: Navy ATS Management Board Representative (PMA-260)
ATS Management Board

Title: ATS Recommendation for ____________________
[State the weapon system(s) requiring support]

Background: [State the support requirement in terms of parametric, operational and maintenance level requirements, the ACAT level and milestone phase of the weapon system, and the program status of the proposed Non-Standard ATS alternative]

Alternatives Considered: [State the ATS options considered in the analysis]

Problem/Issue: [Present the cost, schedule, and/or parametric/operational deficiency in capabilities as justification for not using a DoD ATS Family as the support solution]

Discussion: [Provide any additional supporting background, rationale, or justification]

Recommendation:

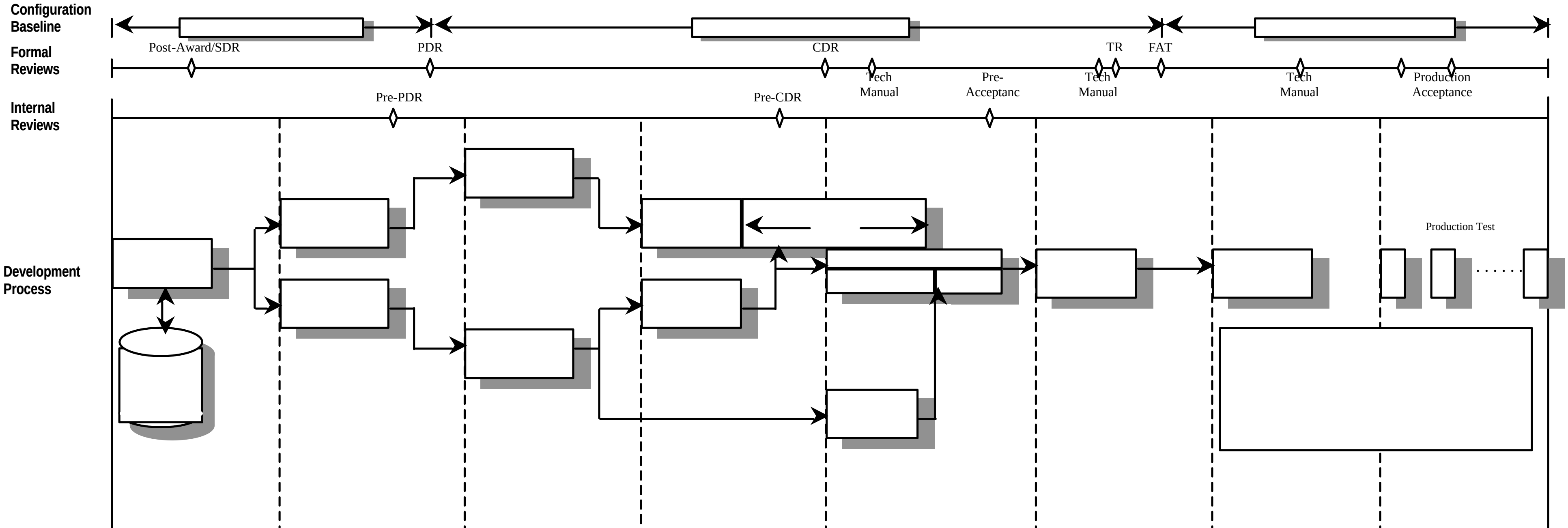
Back-Up Information: (as required)
(1) Parametric Analysis
(2) Cost/Benefit Analysis
(3) Summary of Pros and Cons
(4) Any Additional Substantiating Data

☐ Approved

☐ Disapproved

____
Approval Authority

Appendix 4 - TPS Development Process



Management Tasks	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. SDR/Post Award Review	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Program Control Review(s) 7. Preliminary Design Review	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Program Control Review(s)	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Program Control Review(s) 7. Critical Design Review	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Program Control Review(s) 7. Publications Guidance Conference 8. QA Design Verification Demonstration	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Test Readiness Review 7. Functional Configuration Audit 8. Physical Configuration Audit	1. Program Control Management 2. Configuration/Data Mgmt 3. Quality Assurance Mgmt 4. Systems Engineering Mgmt 5. Development Management 6. Program Control Review(s)	
Test Program Tasks	1. Perform UUT Hardware/Data Analysis 2. Analyze UUT Test Requirements 3. Perform UUT/ATE Compatibility Analysis 4. Establish Testing Concepts 5. Perform Risk Analysis	1. Develop UUT/ID TPS Preliminary Test Strategy 2. Preliminary UUT/ID TPS Eng Support Data (ESD) 3. Perform FD/FI Analysis 4. Partition UUT Circuits 5. Develop Preliminary UUT Simulation Models	1. Develop UUT/ID TPS Detailed Test Strategy 2. Update UUT/ID TPS ESD Data 3. Develop Plans & Procedures 4. Complete Digital UUT Simulation Models 5. Generate CDR Data	1. Code UUT/ID ATLAS Test Program 2. Perform Code Walk-Through 3. Develop UUT/ID Test Program Media 4. Simulate Digital UUT Models 5. Develop TPSD	1. Initiate TPS Integration Log 2. Integrate OTPS ID Self Test TPS 3. Integrate UUT TPS Performance Tests 4. Integrate UUT TPS Diagnostic Tests 5. ID/UUT Fault Insertion Testing 6. Validate TPSD 7. Develop On-Site Verification Plan 8. Develop Acceptance Test Procedures	1. Perform Functional Configuration Audit (FCA) a.Design Verification Test (DVT) b.Safety Verification c.Integration Log Book Review d.TPSD Review 2. Transportability Demo	1. OTPS Suitability & Supportability Testing 2. Supported by Contractor (Conducted by Gov't)	1. Site Verification 2. OTPS Installation 3. ID Self Test 4. UUT Performance Test
Hardware Tasks	1. Establish ID Concept 2. Perform Preliminary ID Merge Analysis 3. Allocate Active ID Functions	1. UUT/ID Interface Definition 2. Preliminary OTPS Grouping 3. Develop Preliminary ID Hardware Design 4. Preliminary R/M/S Analysis	1. Detailed ID Hardware Design 2. Develop Final OTPS Grouping 3. Release ID Drawing Package 4. Order Parts 5. Specialty Engineering Analysis	1. Manufacture Pre-Prod H/W 2. Pre-Integration ID H/W Testing 3. Manufacture 1st Article ID Hardware (Mechanical)	1. Manufacture 1st Article ID Hardware 2. Pre-Integration ID Hardware Testing 3. Update Technical Data Package 4. ID Hardware Qualification Testing	1. Physical Configuration Audit (PCA)		
Logistics Tasks	1. Develop LSA Strategy 2. Develop LSA Plan 3. Identify Review Rqmnts 4. Functional Rqmnts Analysis	1. Perform Task Analysis	1. Develop Parts Provisioning	1. Update Logistics Data	1. Update Logistics Data	1. Update Logistics Data	1. Update Logistics Data	1. Update Logistics Data
Documen-tation	1. TPS Development Plan 2. Test Program Style Guide 3. CM Plan/Data Plan/QA Plan/Mfg. Plan 4. TPS Development Folders 5. LSA Plan	1. Prelim UUT/ID TPS ESD 2. Long Lead Time Parts List 3. Preliminary DWG's & Lists 4. Maintenance Plan (LSA-024) 5. SERD (LSA-070) 6. Fault Accountability Matrix	1. Update PDR Data 2. UUT/ID TPS ESD Data 3. Detailed Drawings & Lists 4. Plans & Procedures 5. Pre-Screening (LSA-032) 6. Prov. Parts List (LSA-036)	1. Develop CDR Data 2. Develop Technical Manual Data 3. Fault Accountability Matrix (Update)	1. Update All Previously Developed Data 2. Generate FCA/PCA Data Package 3. On-Site Verification Plan 4. Acceptance Test Procedures	1. Develop Test Readiness Review (TRR) Data 2. Update All Previously-Developed Data 3. Fault Accountability Matrix (Final)	1. DD250 2. All CDRLs Delivered and Approved	

Appendix 5: TPS Procurement Checklist

CASS TPS Acquisition Readiness Checklist

- ❑ Approved Management Plan
  - Management plan identifies responsibilities for management, engineering, logistics, procurement and Test & Evaluation
  - Management plan shall be signed by the designated procurement activity, the designated government acceptance representative, the TPS acquisition manager, and the T&E representative

- ❑ Acquisition strategy determined
  - Sole source/competition
  - Quantity being bought in what year

- ❑ Contract type determined
  - Fixed price
  - Cost plus

- ❑ Acquisition plan or Justification & Authorization status

- ❑ Results of the Level of Repair Analysis (LORA) or requirements of the maintenance plan for the UUTs for which OTPSs are being procured

- ❑ Source of the UUTs for OTPS integration determined

- ❑ Maintenance for UUTs during OTPS integration determined

- ❑ Special test consideration for the following determined:
  - Holding fixtures
  - Interface devices that require calibration
  - Forced air cooling
  - Liquid cooling

- ❑ Quantity and configuration of CASS stations required for integration determined
  - Parametric workload and CASS station requirements data submitted
  - Results of SSM
  - Define any known CASS incompatibilities and work-arounds (test strategies, ancillaries or active IDs)

- ❑ Determine whether CASS TPS integration stations are to be provided as CFE or at the TIF
  - TPS integration stations allocated in the CASS Introduction Plan
  - Site activation stations allocated in the CASS Introduction Plan

CASS TPS Acquisition Readiness Checklist (con't)

- ❑ Method of CASS maintenance selected for the duration of the contract
  - GFE
  - TIF
  - CFE
- ❑ Strategy for funding implementation of System Problem Reports (SPRs) determined
- ❑ Type and method for providing UUT source data to the TPS developer
- ❑ TPS end-to-end test time required by the contract
- ❑ Version of the TPS Red Team Package determined. Any changes highlighted.
- ❑ Funding profile required by fiscal year
- ❑ Is CASS defined as factory test equipment on the prime contract?
- ❑ Plan to develop lessons learned defined
- ❑ Pre-planning Procurement Conference (PPC) schedule